ENGINEERING AND OPERATIONS ISSUES
Draft Issues List, Revised April 17, 2001

April 17 LIST		CONSOLIDATED ISSUES LIST	
EE1	Consider adding additional generating capabilities (some existing infrastructure).	E1	Evaluate the potential for adding additional generation using existing infrastructure, modifying facilities to increase storage and associated generation, and changing operation to provide spinning reserve (e.g., motoring)
EE2	Intake on North side of dam - Afterbay outlet motoring to provide spinning reserve.		See E1
EE3	Use real-time hydraulic projections, inflow/outflow rather than yearly projections.	E2	Evaluate the potential to improve operations through use of real-time watershed hydrologic projections rather than annual projections. Coordinate with U.S. Army Corps of Engineers data gathering.
EE4	PLC upgrades?	E4	Evaluate environmental and economic aspects of different flow regimes using support system models as a tool (see Issue E2 above). Factors to be considered include timing, magnitude and duration of flows, pump-back scheduling and maintenance scheduling, and hatchery operations.
EE5	Coordination with releases from other water storage facilities? - for fisheries protection CVP facilities preventing straying of salmon and steelhead.	E3	Evaluate potential for improved coordinated operation of Oroville Facilities through additional coordination with other water storage facilities and regulatory and resource agencies (e.g. CALFED). Also, see F11
EE6	Coordination and evaluation of DF & G, USFWS and other regulatory agencies release requirements to better fit with reality. High agency level decision.		See E3, F11.
EE7	Potential to use support system models to evaluate different flow regimes with historic and real-time information.		See E4.
EE8	Why is there no requirement to maintain minimum emergency storage at Lake Oroville? (Evaluate needs related to other resources.)		See E4.

EE9	Any plan to address increasing siltation in lake?	E8	Effect of reservoir sedimentation and sediments on project operations. Also, see G4, G5.
EE10	Ramping rates effects on downstream facilities.	E6	Effect of ramping rates on downstream facilities, power generation, water supply, water temperatures, and fish. Also, see F1, F10, W10.
EE11	Coordinate releases with other water storage facilities for flood release.	E5	Impact of flood releases on Lake Oroville dam (including need for access to north side of dam) and downstream facilities including downstream levee stability and potential for ameliorating downstream flooding through coordinated releases with other water storage facilities. Consider past floods, improvements in channel carrying capacities, need for more storage (e.g., installing Obermeyer gates on the emergency spillway ogee), operational changes, early warning system for downstream releases, and updating of flood operation manual.
EE12	Utilize current watershed hydrologic data from planning (coordinate with COE data gathering).		See E2.
EE13	Operational constraints as they relate to other resources and water supply.	E15	Evaluate operation alternatives that maintain or improve current water supply under all operation plans and conditions. Also, see E1, E4.
EE14	Potential physical changes to facility to increase storage and generation. Impacts to existing and potential facilities.		See E1, E15.
EE15	Evaluate temperature requirements and potential Eng. (?) operational modifications	E12	Evaluate operational and engineering alternatives including selective withdrawal from Lake Oroville, Thermalito Afterbay, the hatchery, and the low flow section to meet various downstream temperature requirements.
EE16	Inequity of power pricing structure.	E9	Effect of Oroville Facilities power generation pricing schedule on local economy.
EE17	Update flood operation manual		See E5

EE18	What are 50-year projections for water/power demands and plans to meet those needs and impacts of meeting demands? (Context of existing full allocations.)	E10	Effect of future water demands on project operations including power generation, lake levels and downstream flows. Consider sale of existing water allotments to downstream users.
EE19	Early warning system for downstream releases.		See E5.
EE20	Sale of existing water allotments to downstream users.		See E10.
EE21	Outflow impacts to downstream flood risk (levee stability) COE?		See E5.
EE22	Stability of Oroville levee system through low flow section and effects of high flow.		See E5..
EE23	Evaluate channel capacities and potential need for more storage / flood protection engineering and operations deflection into levees by gravel bars.		See E5.
EE24	What engineering or other reasonable and prudent solutions are available that would prevent the interbreeding of fall and spring-run Chinook salmon in the low flow section of the Feather River (migration barrier and /or flow and temperature changes in the low flow section)?	E13	Evaluate operational and engineering alternatives to prevent interbreeding of fall and spring-run Chinook salmon in the low flow section of the Feather River (e.g., migration barrier and/or flow and temperature changes) Also see, F3, F13.
EE25	Operations and engineering of the project determine the manner and extent water is moved into, through and out of the project area. Current operations, which affect timing, magnitude and duration of flow from current release schedules, pump-back scheduling and maintenance schedules impact both lotic and lentic ecosystems affected by the project. Operations need to be examined and their impacts evaluated and minimized for inclusion into terms and conditions of the settlement.		See E4.
EE26	Facility operations and impact – on bass fishery and spawning activities at Afterbay. (Protect and enhance bass fishery.)		See E4, F3, F1.
EE27	Sediments behind dam (operations).		See E8, G4.

EE28	How do the pump-back operations during the summer months affect water temperatures required for holding and rearing of steelhead and spring-run Chinook salmon in the low-flow section and in the river downstream of Thermalito Afterbay?		See E4, F1, F10, F11, F13.
EE29	Project features and operations alter the hydrology of the system, creating the possibility for scour zones within both natural and designed channels. What affects do discharge and ramping rates have on substrate scour and the mobilization of sediments into the water column downstream? How have turbidity levels been affected by project operation?	E7	Effect of the project including discharge (magnitude, frequency and timing) and ramping rates and the altered stream hydrology on substrate scour, mobilization of sediments, turbidity levels, and riparian vegetation in the low flow reach and downstream of the Afterbay. Also, see G1, G5.
EE30	Alterations in stream hydrology affect the natural fluvial geomorphologic processes of a riverine system. How has the change in magnitude, frequency and timing of peak flows on the Feather River affected riparian vegetation recruitment in the low-flow reach and immediately downstream of the Afterbay?		See E7, G1, T3, T5.
EE31	Impact of project facilities and operations on fish passage. This includes structures, flows and/or water quality conditions that impede or block passage within and from current and/or historic habitat and operations that impact passage or have the potential to enhance passage. Passage includes movement of spawning or holding adults, emigrating smolts, or movement of juveniles to different habitat areas for purposes of feeding, avoiding predators or sheltering.		Issue transferred to Environmental. See F1, F4, W1, W11, W14.
EE32	Adequacy of current in-stream flow requirements to conserve anadromous salmonids, their habitats and forage. This includes providing a range or schedule of flows necessary to optimize habitat, stable flows during spawning and incubation of in-gravel forms, flows		See E4, F11, W10, G1.

EE32 Cont.	necessary to ensure redd placement in viable areas, and flows necessary for channel forming processes, riparian habitat protection and maintenance of forage communities. This also includes impacts of flood control or other project structures or operations that act to displace individuals or their forage or destabilizes, scours, or degrades habitat.		
EE33	Impact of hatchery facilities and/or operations on anadromous salmonids. This includes the direct, indirect and cumulative impacts of hatchery product on anadromous salmonids and the direct, indirect and cumulative impacts of hatchery facilities and operations on salmonids and their habitats.		See E4, F9.
EE34	Project structures or operations that either have in the past or continue to introduce predators, create suitable habitat for predators, harbor predators, or are conducive to the predation of salmonids.		Issue transferred to Environmental. See F1, F5, F7, F9, F10, F15, F16.
EE35	Impact of project structures and operations on water quality conditions necessary to sustain anadromous salmonids and their habitats.		Issue transferred to Environmental. See W1, W10, W11, W14.
EE36	Direct, indirect and cumulative impacts of project facilities and operations on sediment movement and deposition, river geometry, and channel characteristics. This includes impacts on stream competence, capacity, bank stability and extent, duration, and repetition of high flow events.		See E7, G1, G5.
EE37	One of the most significant environmental changes caused by the Oroville Facilities Project was changing the nature of this relatively low elevation waterway from a lotic to lentic system. The confluence of three tributaries of the Feather River and its free flowing nature has been replaced by Lake Oroville. The transport functions (sediment, nutrients etc.) normally	E14	Evaluate operational alternatives that balance and maintain acceptable water quality standards including those for MTBE under all operational plans and conditions. Also see G1.

EE37 Cont.	associated with the energy of a lotic system have been replaced by an overall storage function of a lentic system. Thus, there are water quality changes accompanying this shift of ecosystems both within and downstream of the lake. The FWS is concerned about the effects of the current project operations on water quality and changes that may occur with new license conditions. We seek assurance that sufficient numbers of water quality constituents are investigated and that appropriate and rigorous protocols are followed. We seek assurance that investigations will lead to determination of operations alternatives that balance and maintain acceptable water quality standards under all operational plans and conditions set forth in the final agreement.		
EE38	As described in the IIP, operations of the Oroville Facilities including Lake Oroville, have wide-reaching effect on riverine conditions downstream in the Feather River, Sacramento River, and San Francisco/San Joaquin Bay Delta. In addition, water supply stored in Lake Oroville is delivered to Southern California through State Water Project canals and thus has effects on growth and development within the SWP service area. There are a variety of federally listed, threatened, proposed and species of concern that occur within and are supported by suitable habitat in the project affected area. There is potential for license condition changes that could potentially adversely impact listed, proposed, and/or species of concern in areas affected by water supply deliveries (including transfers), flood control, recreation activities and other project operations. The FWS wants to assure that future license		Issue transferred to Environmental. See F13.

EE38 Cont.	conditions and attendant PM&E measures protect listed and proposed species, assist in their recovery and prevent future listings of any species of concern that may be at risk.		
EE39	As follow-up to the above paragraph, the operations of the Oroville Facilities are integrally linked to federal water project operations and those of other entities in the Central Valley. Coordinated decisions for water project operations, including Lake Oroville take place on a daily basis. FWS wants to assure that areal extent of investigation and content of the scope of analysis is sufficient so that ESA requirements are fully addressed with regards to direct, indirect, cumulative, interrelated and interdependent activities. This means examining all facets of project features such as distribution and transmission lines and how their operations/maintenance practices may affect T&E species. How do the pump-back operations during the summer months affect water temperatures required for holding and rearing of steelhead and spring-run Chinook salmon in the low-flow section and in the river downstream of Thermalito Afterbay?		Issue transferred to Environmental. See E4, F1, F10, F11, F13.
EE40	Does the increase in river water temperature that results from warmer Thermalito Afterbay releases during the spring, summer, and fall months limit the amount of suitable steelhead and salmon habitat in the river downstream of Thermalito Afterbay?		Issue transferred to Environmental. See W10, W11, W14, F3, F10.
EE41	Direct, indirect and cumulative impacts of project facilities and operations on sediment movement and deposition, river geometry, and channel characteristics. This includes impacts on stream competence, capacity, bank stability and extent, duration, and repetition of high flow events.		See E7. G1, G5.

EE42	Bedload transport, current condition of habitat potentially impacted by project and alternatives to conserve or enhance		See E7, G1, G5.
EE43	Adequacy of selective withdrawal structure to maximize water temperature for anadromous salmonids.		See E12, W12.
EE44	Priority of salmonid habitat conservation in current operating criteria and various operating agreements.		Issue transferred to Environmental. See F5, F13, F14, F16.
EE45	Introgression occurring between fall-run and spring-run Chinook populations in the Feather River due to hatchery practices and impassable migration barriers.		Issue transferred to Environmental. See F9, F1, F4, W1, W11, W14.
EE46	At the first workgroup meeting, a presentation was given on how the water system works from reservoir to Southern California. A chart was shown on Oroville reservoir storage denoting the flood storage limits and elevations at time of year and downstream water requirements for the delta. In the presentation, it was said that the data and chart was from 1971 that DWR in Sacramento was using for those storage elevation levels and acre feet amounts. I question that information and sincerely hope that is not the case.		See E8.
EE47	In the FERC Part 12 guidelines, the Probable Maximum Flood (PMF) is to be examined after each major flood event. The Feather River has had two major flood events since 1971; once in February 1986 and again in January 1997. The FERC Part 12 regulation guidelines also state that when new Hydro-meteorological Reports (HMR's) are issued, the PMF is to be re-examined. New HMR's (HMR 58 & 59) were issued in 1999, thus precipitating the Oroville 2100 project to be re-examined in light of the new data. I think that this has been done for the 2100 project in the last Part 12 inspection and the Work Group should be given the		See E5.

EE47 Cont.	correct data. If not done, the question is why not?		
EE48	The workgroup should be provided with the last FERC Part 12 inspection in written hard copy done by its Independent Consultant.		Work Group information request.
EE49	Oroville reservoir flood storage chart needs to be updated or obtain a copy of the latest updated chart to be provided to the Work Group.		Work Group information request.
EE50	What is the Hazard classification for Oroville Dam?		Work Group information request.
EE51	Provide the Work Group with the study data done on installing Obermeyer Gates on the emergency spillway ogee to raise the reservoir elevation in a major flood runoff event? What is the probability of this installation?		See E5.
EE52	Provide the workgroup with the latest PMF, HMR, and PMP (probable maximum precipitation) data?		See E5.
EE53	When was the last "Inflow Design Flood" (IDF) study done and was it done on current data?		See E5.
EE54	Effect of tires in Parrish Cove and Bidwell Cove (mosquito abatement).	E11	Effect of tires in Parrish Cove and Bidwell Cove and stakes used to hold down recycled Christmas trees on public safety. (Issue also transferred to Recreation and Environmental.) Also, see F5.
EE55	Effects of stakes used to hold down recycled Christmas trees on public safety		See E11, F5. (Issue also transferred to Recreation and Environmental.)
EE56	Prepare flood inundation maps for a 1997(?) worse case with 300,000 cfs coming out of the dam's normal and emergency spillways. In 1997, it is believed that Oroville storage was almost to a point where the 300,000 cfs of inflow was going to pass through the reservoir. DWR was making plans to evacuate the power plant. The 300,000 would have topped the levees and put 10 feet of water into the town of Oroville.		See E5.

ENGINEERING AND OPERATIONS ISSUES STATEMENTS
Revised April 26, 2001

E1. Evaluate the potential for adding additional generation using existing infrastructure, modifying facilities to increase storage and associated generation, and changing operation to provide spinning reserve (e.g., motoring) (Issues addressed: EE 1, 2, and 14).

E2. Evaluate the potential to improve operations through use of real-time watershed hydrologic projections rather than annual projections. Coordinate with U.S. Army Corps of Engineers data gathering (Issues addressed: EE 3, 12).

E3. Evaluate potential for improved coordinated operation of Oroville Facilities through additional coordination with other water storage facilities and regulatory and resource agencies (e.g. CALFED). (Issues addressed: EE 5 and 6).

E4. Evaluate environmental and economic aspects of different flow regimes using support system models as a tool (see Issue E2 above). Factors to be considered include timing, magnitude and duration of flows, pump-back scheduling and maintenance scheduling, and hatchery operations (Issues addressed: EE 4, 7, 8, 13, 25, 26 28, 32 and 33)

E5. Impact of flood releases on Lake Oroville dam (including need for access to north side of dam) and downstream facilities including downstream levee stability and potential for ameliorating downstream flooding through coordinated releases with other water storage facilities. Consider past floods, improvements in channel carrying capacities, need for more storage (e.g., installing Obermeyer gates on the emergency spillway ogee), operational changes, early warning system for downstream releases, and updating of flood operation manual (Issues addressed: EE 11, 17, 19, 21, 22, 23, 47, 51, 52, 53,56).

E6. Effect of ramping rates on downstream facilities, power generation, water supply, water temperatures, and fish (Issue addressed: EE 10).

E7. Effect of the project including discharge (magnitude, frequency and timing) and ramping rates and the altered stream hydrology on substrate scour, mobilization of sediments, turbidity levels, and riparian vegetation in the low flow reach and downstream of the Afterbay (Issues addressed: EE 29, 30, 36, 41 and 42).

E8. Effect of reservoir sedimentation and sediments on project operations (Issues addressed: EE 9, 27 and 46).

E9. Effect of Oroville Facilities power generation pricing schedule on local economy (Issue addressed: EE 16).

E10. Effect of future water demands on project operations including power generation, lake levels and downstream flows. Consider sale of existing water allotments to downstream users (Issues addressed: EE 18 and 20).

E11. Effect of tires in Parrish Cove and Bidwell Cove and stakes used to hold down recycled Christmas trees on public safety (Issues addressed: EE 54 and 55).

E12. Evaluate operational and engineering alternatives including selective withdrawal from Lake Oroville, Thermalito Afterbay, the hatchery, and the low flow section to meet various downstream temperature requirements (Issues addressed: EE 15 and 43).

E13. Evaluate operational and engineering alternatives to prevent interbreeding of fall and spring-run Chinook salmon in the low flow section of the Feather River (e.g., migration barrier and/or flow and temperature changes) (Issue addressed: EE 24).

E14. Evaluate operational alternatives that balance and maintain acceptable water quality standards including those for MTBE under all operational plans and conditions (Issue addressed: EE 37).

E15. Evaluate operation alternatives that maintain or improve current water supply under all operation plans and conditions. (Issues addressed: EE13, 15)

A number of engineering and environmental issues identified in the comprehensive list are not referenced because they are not engineering and operations issues. Issues EE31, 34, 35, 38, 39, 40, 44, 45, 48, 49, and 50 are either Environmental Work Group issues or do not require further evaluation.